Physics 126 Spring 2017

https://owlspace-ccm.rice.edu/

http://www.masteringphysics.com/

Welcome to your second semester of physics!

We are about to begin our second term studying what one could say is *the fundamental science*. It has served as a model and inspiration for the development of many other branches of human endeavor. The journey of scientific discovery began at the dawn of civilization and has taken us to amazing places.

At the end of this semester you will have a basic but firm knowledge of the laws of Electricity and Magnetism, which will allow you to understand the behavior of a great number of physical systems. Even more important than this, if you are successful you will have developed *an attitude of thought and a way of thinking* that will serve you in many fields of inquiry.

In this class we will be sharing with you some of the insights (accumulated mostly over the last four centuries) about the way nature works and *how we describe it*. Just as important, we would also like to share with you the sense of wonder that nature inspires in us. We hope you will enjoy it!

Faculty

Jared Stenson
OFFICE HOURS: M 11-12 PM
W 2-3 PM
CONTACT: 241 Brockman Hall
stenson@rice.edu
(713) 348-5727

Jose Onuchic
OFFICE HOURS: T evenings, by appt.
Lovett Master house
CONTACT: jonuchic@rice.edu
(713) 348-4197

Stan Dodds (Labs)
OFFICE HOURS: During any lab
CONTACT: 215 Herzstein Hall
dodds@rice.edu
(713) 348-2510

Jabus Roberts
OFFICE HOURS: T 2-6 PM
223 Herman Brown Hall
CONTACT: 229 Herman Brown Hall
roberts@rice.edu
(713) 648-5941

Course Objectives and Learning Outcomes

Students that successfully complete this course will:

- Have a basic but firm knowledge of the laws of Electricity and Magnetism, which will allow them to understand the behavior of a great number of physical systems and phenomena such as light, optics, and circuits.
- Appreciate a scientific approach to learning and problem solving.
- Develop an aptitude for quantitative, qualitative, critical, and symbolic reasoning.
- Be able to effectively communicate technical ideas to others.
- Have hands-on experience in collecting and evaluating data using simple equipment in a laboratory setting.

1 Venues and Activities

1.1 Class

LOCATION: Herzstein Physics and Astronomy Amphitheater
Tu, Th 9:25 AM – 10:40 AM

The class is large. Despite this, you must get involved and make it as interactive as possible. The goal of class time is to present the most important material in a clear and consistent way, and to identify the most common conceptual difficulties and stumbling blocks in the material. Your participation in class is encouraged and appreciated *and your engagement outside of class is necessary.* It is your responsibility to prepare yourself for class by studying the textbook before each class. *Only in this way can you obtain maximum benefit from lecture.* Please realize, lectures are designed as a *second* opportunity to interact with the material. The format of the class will be a combination of lecturing, conceptual questions, demonstrations, and problem solving. Please notice that we will use class time only to go over the most difficult concepts in each chapter. *We will not cover all the basic material that you need to know to succeed in the class.* You will have to do this by studying the textbook outside of class and doing the homework. These are essential parts of the course.

1.2 Homework Help Session

LOCATION: HBRH 223
T 2:00 PM – 6:00 PM

Help sessions are designed to help you understand the material necessary to solve the problems in the homework. Attendance to help sessions is not mandatory. However, they are an excellent environment to meet with other students working on similar problems. Dr. Roberts will run the help sessions but he is NOT there to do the problems for you but only instruct, give guidance, clarify related concepts, and answer questions.

1.3 Laboratory

LOCATION: Herzstein 218 and 220

The laboratory portion meets 8 times over the course of the semester. You should submit your preference form no later than 5:00 PM on Thursday Jan. 12th, to Stan Dodds in HRZ 215. The form will be given to you on the first day of class and may also be found in the labs portion of the class website (Owlspace). Your lab meeting time will be posted outside HRZ 215 by 5:00 PM on Friday Jan. 13th, after compiling student preferences.

Though your lab instructor will make clear the expectations for the laboratory portion of the course, note that *you are expected to prepare for the labs in advance* (including the first lab) by reading over the material.

1.4 Office Hours

Office hours are an excellent resource for you, the student. They will be held in the corresponding instructor's office. They are also important for us as instructors. While you get help on the class, we get feedback on how students are coping with the material. Therefore, we expect to see you there!

2 Nuts and Bolts

2.1 Materials

TEXTBOOK: Knight, Randall D., "Physics for Scientists and Engineers: A Strategic Approach with Modern Physics" 3rd Edition, Pearson Publishing. You can use a 2nd edition of the text but you will be responsible for navigating any differences, which should be minor, such as the numbering of problems. For instance, regardless of your book you will be responsible for completing problems *assigned out of the 3rd edition*. *We also strongly suggest getting the student workbook.*

CALCULATOR: Any scientific calculator with logarithms and trigonometric functions will do.

WEB ACCESS: You will need easy access to the internet. We will use two main websites and email:
Owlspace:
https://owlspace-ccm.rice.edu/
We'll use this site to post course information, announcements, resources, schedules, and/or grade information. *Students are required to check it regularly.*

Mastering Physics:
http://www.masteringphysics.com/
If you do not already have one, you will need to purchase an access code to the "Mastering Physics" website in order to gain access to online homework sets and to submit homework (A code is good for one year). You will also need the COURSE ID: PHYS126SP17. If a code does not come with your textbook you can purchase one at the link above.
Rice Email:
Class announcements will be posted on Owlspace and/or sent to your Rice email account. Please make sure to check both periodically.

2.2 Your Grade

Your success in this course will depend on many factors. Some of them are beyond your control, like your previous experience with math and physics and your natural skills. However, many other factors – *even more important factors* – are entirely up to you. These include your focus, determination, attitude, and most importantly, the *quality* of the effort you spend working on the course. A good *attitude with hard and smart work can make a significant difference in your grade* (see the Resources folder on OwlSpace for more details).

Grade Breakdown	
Laboratory	15%
Homework	
Regular	10%
Pledge Problems	5x2%=10%
Exam I	15%
Exam II	20%
Final Exam	30%

Grade Cut Offs (tentative)	
87%	A-
77%	B-
67%	C-
57%	D-

These are the *minimum* grades that you are guaranteed when your grade is greater than or equal to the cut off listed.

2.2.1 Laboratory (15%)

The laboratory portion of the course is both significant and important. The objective is to gain appreciation for the empirical nature of physical science and to gain experience in testing its relationships. Your grade will be determined by Prof. Stan Dodds and your individual lab instructor. Please refer any questions you might have about the labs to them.

2.2.2 Regular Homework (10%)

Part of your homework grade will be based on weekly homework assignments posted on the MasteringPhysics website http://www.masteringphysics.com (COURSE ID: PHYS126SP17). Each week there will be a set of 15-20 problems to complete. These assignments will be posted (mostly) at noon on a class day and will be due the following Tuesday. Any HW score of at least 95% will be rounded to 100%. Any student scoring below 95% will be given automatically given additional problems in order to bring their score up to 100%. These additional problems will give struggling students extra practice with the difficult material but are optional.

We provide students with some additional resources to help them prepare for exams. For more conceptual study, which is often what students most need, we will place solutions to the Student Workbook in the "Resources" folder on OwlSpace. Other practice problems, practice exams, or solutions will be posted there as well. Lastly, the textbook provides answers to all odd problems found at the end of each chapter that you are encouraged to study for more practice.

*Please note that the problems assigned are the **minimum** that should be completed in order to learn the material. Effortful* study of the topics of the course–including *exploring* extra problems–is *required* in order to learn the material *at the highest level*. If you do the homework quickly and thoughtlessly, or with an aim to finish it rather than to learn from it, *it will not prepare you for exams and your grade will suffer*. Several resources explaining research-based effective study habits have been posted under "Resources" → "Suggested Study Tips/Resources" folder on OwlSpace. *If you are struggling to convert your study into learning (i.e. you are working hard without success) you are strongly encouraged to look at the links provided there.*

2.2.3 Pledge Problems (10%)

Roughly 5 times during the semester students will be assigned a more extensive, take-home problem *on which they "pledge" to work individually*. **Your submission of the problem is taken as an agreement to this pledge**. If approached correctly these problems will not only give students experience working a difficult problem in more depth but will prepare them for the exams. These will be graded for correctness and on the quality of the work.

2.2.4 Exams I, II (15%, 20%)

We will have a total of two midterm exams at the day and time specified on the schedule on the last page of this syllabus. *Please make sure that you make arrangements, travel and otherwise, so that you can take the exams at the scheduled times. Only documented medical emergencies and official conflicting university-endorsed activities will be considered as exceptions.*

Each midterm exam will test you only on the chapters covered since the previous exam though you should recognize that physics is necessarily a subject the builds later results off of earlier insights. In general, all exams (including the final exam) will have a combination of conceptual multiple choice questions and free-response multiple-part problems (like the homework and Pledge Problems). Note also that exams are increasingly weighted more heavily as we go throughout the course. This means that your grade will still be subject to change even late in the semester. *It is also more advantageous to finish strong than it is to start fast.* Early on, *building a lasting conceptual foundation is more important than merely "finishing assignments."* This also mirrors the cumulative nature of scientific learning in which first principles are constantly revisited.

2.2.5 Final Exam (30%)

The final exam will be given during the regularly scheduled week for final exams at Rice. *You are required to take the final at the time and place specified by Rice University.* Please do not make travel arrangements before the last day of final exams (Apr 26-May 3). The final is *comprehensive* but will emphasize material from the last third of the semester.

2.3 Policies

2.3.1 The Honor Code

We expect you to uphold the ideals set out by the honor council for Rice University students. More information can be found at http://honor.rice.edu/.

2.3.2 Lectures

All cell-phones and laptops should be turned off during class. Be polite and considerate to us and your fellow classmates. If you are late or need to leave early, please enter and leave the room as quietly as possible.

2.3.3 Homework

You are advised to work on your homework *individually* for *as long as you are making progress*. Discussing, articulating, and learning from your peers is very useful and important but *it must remain constructive* (reasoning-centered and independent rather than answer-centered and conforming). If you need help from others you may collaborate but *do not confuse this with the important task of making progress on your own.* Working *wisely* on these problems is an essential part of your training and it will improve your performance on the exams. You are wasting your time when you have somebody else solve a problem for you, for the same reason an athlete is wasting his or her time letting his/her friend workout for them.

In OwlSpace, under “Resources,” you may find practice problems/exams and study helps to assist preparing for exams. Please note that *the only problems that benefit you are the ones you make your own by investing individual effort.* Be aware that *memorizing solutions to different kinds of problems is a notorious waste of time!*

2.3.4 Exams

Exams must be completed within the allotted time and with no outside assistance. Instructors will periodically enter the classroom, and you are permitted to ask questions of them to clarify what is written on the exam. The *instructors will not provide any information that would give you an unfair advantage over your classmates.* There should be no communication with any other persons (verbal, electronic, etc.) other than the instructor. The use of calculators on the exam is permitted. You will also include a signed copy of the honor pledge on your exams: “On my honor, I have neither given nor received any unauthorized aid on this exam nor have I observed any improper behavior in other students.”

Please note that you will have one week after an exam’s grade is posted in Owlspace to report any problems with the grading or the recording of the grade of your exam. To ask for a re-grade, please attach to your exam a note with a specific explanation of the problem and return it to the instructors. We will review the *whole* exam, not just the problem in question, and will make any necessary corrections. Clearly, since we re-grade the entire exam, *the assigned grade can increase, decrease, or stay the same.* This re-grade process is not intended to dicker over a point here or there based on an interpretation of a detail–those tend to average out. Instead *it is intended to assist those who have been penalized due to a clear error in the grading.* If possible, please consult the exam key before asking for an explanation or re-grade.

2.3.5 Late Policy

As a general policy, *no late exams will be permitted.* Exceptions to this rule and opportunities for make-up are *rare* and are limited to *documented medical emergencies and official conflicting university-sponsored activities.* Laboratory policies will be set up by Prof. Dodds and your lab instructor. It is advantageous to the student to discuss these situations with the instructor in person *and* by email *in advance.* If the nature of the circumstance prevents advance notice, it is in the student’s best interest to discuss it with the instructor *as soon as possible.*

2.3.6 Students with Disabilities

Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with Dr. Stenson during the first two

weeks of class. All such discussion will remain completely confidential. Any documentation must come directly from Disability Support Services in Allen Center.

2.3.7 Standard Disclaimers

The instructor has authority to rule on any point not covered in this syllabus.

The syllabus is subject to change at the discretion of the instructor. Students will be notified ahead of time before any changes take effect.

Schedule for Physics 126 Spring 2017 (tentative)

Week	Topics	Chs.	Laboratory
1/9	Superposition	21	
1/16	Superposition, Wave Optics	21, 22	Standing Waves
1/23	Wave Optics, Ray Optics^	22, 23	Diffraction/Interference
1/30	Ray Optics	23	Lenses and Images
2/6	Optical Instruments, **MIDTERM RECESS**	24	
2/13	Optical Instruments,^ Electric Charge & Force	24, 25	Optical Instruments
2/17	**EXAM I, 7-9 PM**		
2/20	Electric Charge & Force, Electric Fields	25, 26	
2/27	Electric Fields, Electric Potential	26, 27	Electrostatic Phenomena
3/6	Electric Potential,^ Potential & Field	27, 28	
3/13	**SPRING BREAK**		
3/20	Potential & Field, Current & Resistance	28, 30	Electric Field Mapping
3/24	**EXAM II, 7-9 PM**		
3/27	Circuits	31	
4/3	Circuits, Magnetic Field	31, 32	Circuits & Resistivity
4/10	Magnetic Field	32	
4/17	Induction^	33	Magnetic Field Mapping
4/26-5/3	Final Exam, TBA^		

^ tentative due dates for Pledge Problems